

PSE 476-001/ FB 576-001/ Course Syllabus

Environmental Life Cycle Analysis

FALL 2015

3 Credit Hours

Course Description

Societal needs always have a consequence with regards to the environment. The efficient use of the world's resources is paramount. Several options exist when trying to determine which method best serves mankind and its environment. Life cycle analysis (LCA) methods offer a systematic approach to providing guidance in these decisions. Mastering LCA techniques is an integral part of a student's preparation for a career that is professionally, environmentally, and socially responsible. This course is an overview of the various aspects of conducting and interpreting an environmental life cycle analysis on a product or service. Students will learn how to construct a life cycle analysis goal and scope, inventory, assessment and interpretation. Skills in the critique and communication of a life cycle analysis will be developed. The course includes an overview of the following life cycle stages: raw materials, energy, transportation, production, use, and end of life. The course will have an emphasis on systems thinking. The course is targeted for students in any science or engineering program.

Learning Outcomes

The student will be able to

Articulate the value of a Life Cycle Analysis (LCA).

Describe the theory of an LCA.

Outline the steps to conduct an attributional LCA.

Apply LCA allocation methods properly.

Form a goal and scope statement of an LCA

Conduct a life cycle inventory of a process.

Describe common environmental impacts associated with a life cycle inventory of processes.

Approach complex problems with a systems thinking approach.

Conduct a life cycle assessment.

Conduct a consequential LCA.

Interpret, critique, and communicate LCA results.

Course Structure

The course will have regular, mandatory lectures. The students will be assigned reading assignments and homework on a weekly basis. Three in-class exams and a final exam will be administered.

Course Policies

During lectures, no computers or communication devices will be allowed to be used in class, unless specifically required for in-class computer exercises.

Instructors

Dr. Richard A Venditti (richardv) - *Instructor*

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Phone: 919-515-6185

Fax: 919-515-6302

Office Location: Biltmore Hall Room 1204

Office Hours: TBA

Course Meetings

Lectures

Days: TH

Time: 10:15am - 11:30am

Campus: Main

Location: Biltmore 2102

This meeting is required.

Course Materials

Textbooks (several other handouts will be provided)

Life Cycle Assessment Handbook [electronic resource]: A Guide for Environmentally Sustainable Products)

Edited by Mary Ann Curran

Edition: First Edition, Wiley-Scrivener [Imprint] Oct. 2012 Hoboken : John Wiley & Sons, Inc.

ISBN: 978-1-118-09972-8

Web Link: <http://onlinelibrary.wiley.com/book/10.1002/9781118528372>

Cost: Free to NCSU students and staff. Go to NCSU library website and search for book.

Expenses

Student subscription to Sustainable Minds LCA software, \$49 for a 6 month subscription.

<http://www.sustainableminds.com/>. The subscription must be executed before September 1, 2015.

Materials

None.

Requisites and Restrictions

No Prerequisites, Co-requisites or Restrictions

General Education Program (GEP) Information

GEP Category

None.

GEP Category Outcomes

How This Course Will Fulfill GEP Category Outcomes

GEP Co-requisites

This course does not fulfill a General Education Program co-requisite.

Transportation

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

Safety & Risk Assumptions

None.

Grading

Grade Components (Undergraduate/Graduate)

Component	Weight	Details
Attendance	10/0	For each class missed, two points are deducted. For undergraduate students only.
Homework	30/30	Nine homeworks are graded on a scale of 0 to 100. Homework will be due one week after they are assigned. One homework will be an LCA project and will be weighted equal to two homework assignments.
Tests	40/40	Three in-class tests will be administered.
Final Exam	20/20	A Final exam will be administered in-class.
LCA Report	0/10	LCA powerpoint presentation with annotations and references. Not required for undergraduate students.

Letter Grades, uses standard NCSU grading:

97 ≤	A+	≤	100
93 ≤	A	<	97
90 ≤	A-	<	93
87 ≤	B+	<	90
83 ≤	B	<	87
80 ≤	B-	<	83
77 ≤	C+	<	80
73 ≤	C	<	77
70 ≤	C-	<	73
67 ≤	D+	<	70
63 ≤	D	<	67
60 ≤	D-	<	63
0 ≤	F	<	60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to <http://policies.ncsu.edu/regulation/reg-02-20-15>.

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at <http://policies.ncsu.edu/regulation/reg-02-15-4>.

Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at <http://policies.ncsu.edu/regulation/reg-02-50-3>.

Late Assignments

Late homework will not be accepted except when approved by the instructor with (1) prior notification or (2) with evidence of an emergency situation.

Attendance Policy

Attendance

Mandatory. See grading for penalty.

For complete attendance policies, please see <http://policies.ncsu.edu/regulation/reg-02-20-3>

Absences

Absences may be excused for good, unavoidable reasons if approved by instructor before-hand or in emergency situations.

Makeup Work

Only allowed if prior approval has been granted for late or makeup work.

Additional Excuses Policy

None.

Academic Integrity

Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at <http://policies.ncsu.edu/policy/pol-11-35-01>

Academic Honesty

See <http://policies.ncsu.edu/policy/pol-11-35-01> for a detailed explanation of academic honesty.

Honor Pledge

Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

Electronically-Hosted Course Components

There are no electronically-hosted components for this course.

Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office (<http://www.ncsu.edu/dso>), 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at <http://policies.ncsu.edu/regulation/reg-02-20-01>.

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05> or http://www.ncsu.edu/equal_op/. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Course Schedule

NOTE: The course schedule is subject to change.

Unit 1 –

Introduction to LCA

Unit 2 –

Integral Concepts in LCA

Unit 3 –

Life cycle inventory methods

Unit 4 –

Life cycle inventory methods

Unit 5 –

Life cycle stages and databases - raw materials, energy, transportation, production

Unit 6 –

Life cycle stages and databases – production, use, end of life, recycling

Unit 7 –

Life cycle impact assessment

Unit 8 –

Life cycle impact categories – carbon footprinting, global warming

Unit 9 –

Life cycle impact categories – fossil fuel depletion , acidification, eutrophication, ozone, respiratory effects , ecotoxicity, land use, resource depletion,

Unit 10 –

Life cycle impact categories – energy, water footprinting

Unit 11 –

Understanding weighting, normalization and grouping Uncertainty assessment

Unit 12 –

Social LCA

Unit 13 –

Consequential LCA

Unit 14 –

Product Declarations and Environmental Labeling